

# On the Identity of the Poorly Known Japanese Liverworts *Chiloscyphus mororanus* Steph. and *C. submersus* Warnst. (Jungermanniopsida, Marchantiophyta)

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The type specimens of *Chiloscyphus mororanus* Steph. and *C. submersus* Warnst., were examined and both species are synonymized under *C. polyanthos* (L.) Corda. Illustrations and brief descriptions as well as taxonomic discussions for each species are provided.

Key words: *Chiloscyphus polyanthos*, Hepaticae, liverworts, Marchantiophyta, taxonomy

While preparing a checklist of Japanese liverworts, I recognized two poorly known Japanese species of *Chiloscyphus*: *C. mororanus* Steph. and *C. submersus* Warnst., both of which were known only from type material and have been long overlooked. For this study I examined the type specimens of the two species to resolve their taxonomic status and chose a lectotype for *C. submersus*. Brief descriptions along with illustrations and a discussion for each species are provided below.

## 1. *Chiloscyphus mororanus* Steph.—Fig. 1 A–E.

I confirmed that the type specimen has the following morphological characters: Plants pale brown to dark green in aged herbarium material, 5–10(–15) mm long × 2–3 mm wide including leaves; stems 150–200 µm wide; leaves usually imbricate, occasionally remote, suborbicular–oblong with round–truncate apex, (0.8–)1.5–1.8 mm long × (0.8–)1.0–1.5 mm wide; underleaves 300–400 µm long × 200–300 µm wide, bilobed usually with two lateral teeth; median cells of leaf polygonal, (25–)30–40(–50) µm long × (20–)25–

35(–40) µm wide, smooth, thin-walled, trigon indistinct. Autoicous. Perianth campanulate, three-lobed; lobes entire to shallowly bifid with or without denticulate margin; calyptra long emergent from the perianth apex.

*Chiloscyphus mororanus* was described by Stephani based on a specimen collected by Urban Faurie in Muroran (or Mororan), Hokkaido without indicating a collection number (Stephani 1907, p. 696). The Stephani collection in Genève (G) has only a single specimen, *Faurie 1116*, which is considered to be the holotype (McNeill *et al.* 2012, ICN Art. 9.1., Note 1). This specimen was also shown in Stephani's *Icones Hepaticarum* (Stephani 1985, p. 001913). Stephani mentioned that *C. mororanus* is similar to *C. pallescens* (Ehrh. ex Hoffm.) Dumort., but differs from the latter by its smaller size and configuration of the perianth, and that its stems are to 25 mm long, perianth are obconic, lobed to 3/4 of its height, and apexes of the lobes are emarginate with two teeth with entire or somewhat denticulate margins (Stephani 1907). I consider that the size of the plant varies greatly among populations

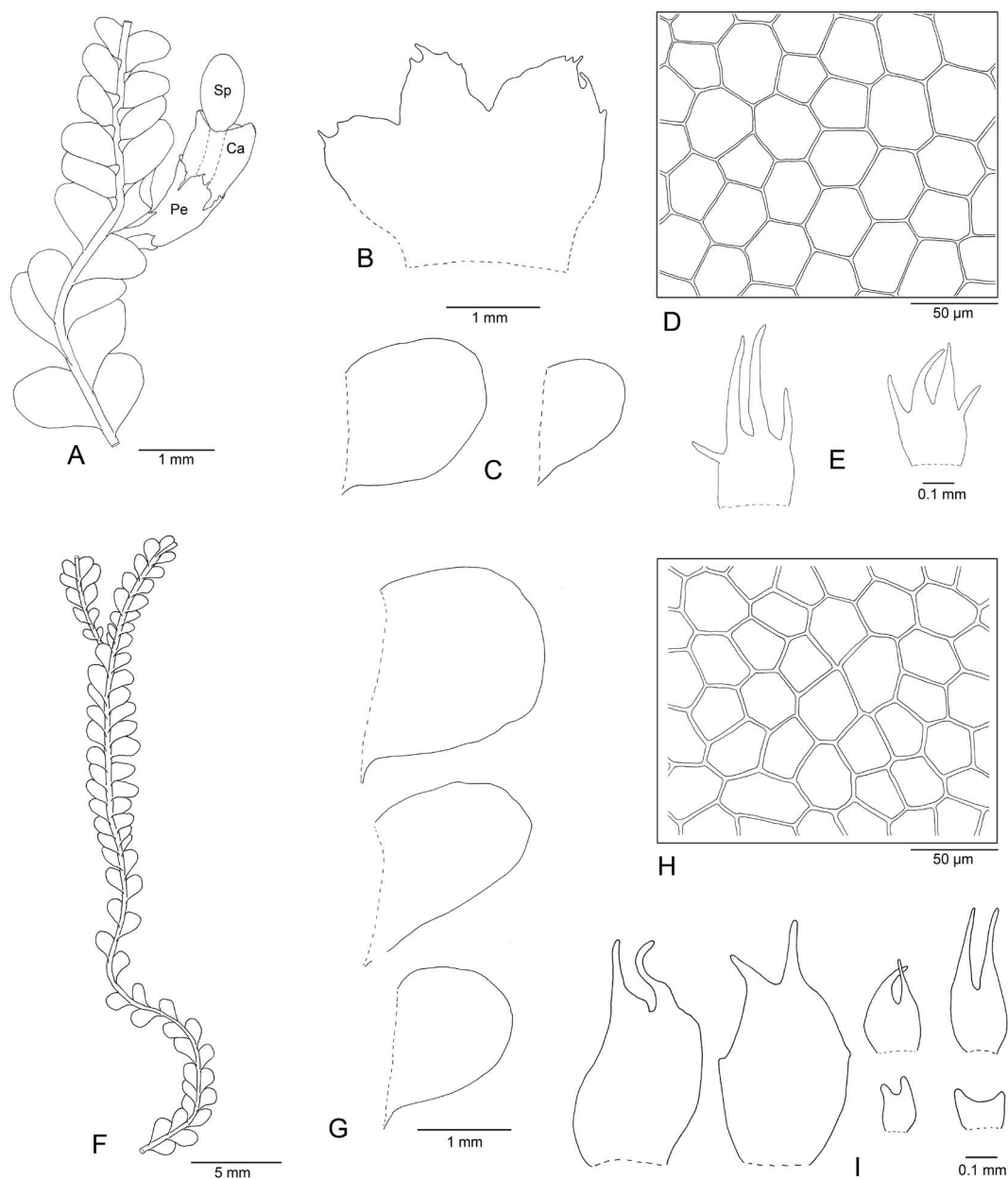


FIG. 1. *Chiloscyphus polyanthos*. A: Shoot bearing sporophyte (Sp: sporophyte, Ca: calyptra, Pe: perianth). B: Perianth. C: Leaves. D: Median laminal cells. E: Underleaves. F: Shoot. G: Leaves. H: Median laminal cells. I: Underleaves. A–E drawn from *Faurie 1116* (G, holotype of *C. mororanus*), F–I from *Sakurai 97* (MAK, lectotype of *C. submersus*).

and has little taxonomic value among the species of *Chiloscyphus*. Perianths of *C. mororanus* are different from those of *C. pallescens*. In *C. pallescens* they are three-lobed and the lobes are usually distinctly dentate (Schuster 1980, Damsholt 2002). The present study proved that perianths of *C. mororanus* are indistinguishable from those of *C. polyanthos* (L.) Corda (Fig. 1A–B). In addition, such characters as leaf shape (Fig. 1C), size of median laminal cells (Fig. 1D), and long emergent calyptrae from perianth apex (Fig. 1A) are also identical between *C. mororanus* and *C. polyanthos* (Schuster 1980, Damsholt 2002), and no distinctive characters were found between them. I therefore propose that *C. mororanus* be treated as a synonym of *C. polyanthos*.

## 2. *Chiloscyphus submersus* Warnst.—Fig. 1 F–I.

Plants blackish brown in aged herbarium material, (16–)20–30(–44) mm long  $\times$  (1.0–)1.5–2.0(–2.5) mm wide including leaves; stems (200–)250–300(–400)  $\mu$ m wide; leaves remote–imbricate, suborbicular–oblong with round–truncate apex, flat, (1.0–)1.2–1.3(–1.8) mm long  $\times$  (1.2–)1.4–1.5(–2.0) mm wide; underleaves highly variable in size and shape of sinus, usually well-developed with 400–800  $\mu$ m long  $\times$  160–400  $\mu$ m wide and bifid to 1/2–1/3 of their length with V-shaped sinus, occasionally small with 160–250  $\mu$ m long  $\times$  100–150  $\mu$ m wide and shallowly bifid with round sinus, showing  $\pm$ crescent appearance; median cells of leaf polygonal, (16–)25–30(–45)  $\mu$ m long  $\times$  (16–)20–30(–40)  $\mu$ m wide, smooth, rather thin-walled, trigon indistinct.

*Chiloscyphus submersus* was described by Carl Warnstorf in 1916 based on plants collected in Ozegahara Marshland (on the boundary of Gunma and Fukushima prefectures, Honshu) by the Japanese bryologist, Kyuichi Sakurai. According to the original description, *C. submersus* grows deep in streams and is morphologically similar to *C. polyanthos*, but in *C. submersus* underleaves are much smaller and are crescent-shaped. Unfortunately, the holotype of *C. submersus* is not in the Warnstorf collection in the Botanischer Garten und Botanisches Museum Berlin-Dahlem (B) and was most probably de-

stroyed during the 1943 fire (H. J. M. Sipman personal communication, 2013). As part of this study, I searched the Sakurai collection in the Makino Herbarium (MAK) and found an isotype (Sakurai 97), which fits the original descriptions and thus can serve as the lectotype.

Warnstorf (1916) considered small, crescent underleaves observed in *Chiloscyphus submersus* to be of taxonomic value in distinguishing it from *C. polyanthos*. In *C. submersus*, however, the size and shape of underleaves are highly variable, even on a single stem (Fig. 1I). Most underleaves are well-developed and indistinguishable from those of *C. polyanthos*. In addition, the small crescent underleaves are only occasionally present. This morphological variation might be due to growing on submerged substrata in running water, and *C. submersus* may merely be a habitat modification of *C. polyanthos*. Judging from a comparison of the morphological characters, I consider *C. submersus* to be a synonym of *C. polyanthos*. This synonymization was proposed by Hattori (1952), but he presented no taxonomic discussion. Hattori's annotation on the specimen, Sakurai 97 (MAK), suggests that his taxonomic treatment also was based on examination of the same material.

Some authors recognized *C. polyanthos* var. *rivularis* (Schrad.) Nees., and distinguish it from var. *polyanthos* by its deep green or blackish color, few rhizoids, remote to contiguous leaf arrangement, smaller and flat leaves with smaller median leaf cells, and ecological traits of growing on submerged substrata in running water (Schuster 1980, Damsholt 2002). As suggested by Müller (1954, p. 610), the morphological and ecological features of *C. submersus* (Fig. 1F–I) fit well var. *rivularis* and they appear to be identical. I also consider *C. polyanthos* var. *rivularis* to be no more than a habitat modification of *C. polyanthos* that should be treated as a synonym of it.

## Taxonomic treatments

***Chiloscyphus polyanthos* (L.) Corda**, *Naturalientausch* 12: 651. 1829.

Basionym: *Jungermannia polyanthos* L., Sp. Pl.: 1131. 1753.

*Jungermannia pallescens* var. *rivularis* Schrad., Syst. Samm. Cryptog. Gew. 2: 7. 1797.  $\equiv$  *Chiloscyphus polyanthos* var. *rivularis* (Schrad.) Nees, Naturgesch. Eur. Leberm. 2: 374. 1836.

*Chiloscyphus mororanus* Steph., Sp. Hepat. 3: 696, 1907. *Typus*. Japan, Hokkaido, Muroran (or Mororan), 30 April 1894, *Faurie 1116* (G-69448!, holotype; KYO!, isotype), *syn. nov.*

*Chiloscyphus submersus* Warnst., Hedwigia 57: 74. 1916. *Typus*. Japan, Honshu, Ozegahara Marshland, 13 August 1911, *Sakurai 97* (MAK!, lectotype designated here).

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